RxNav-in-a-Box – A locally-installable version of RxNav and related APIs

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Motivation

For the past ten years, the National Library of Medicine (NLM) has provided the RxNorm browser, RxNav, and application programming interfaces (APIs) to support the adoption and distribution of RxNorm, the NLM standard terminology for drugs. RxNav and companion APIs also extend the scope of RxNorm by linking RxNorm drugs to physician-friendly terms (RxTerms), drug classes (RxClass) and drug-drug interaction information, and by providing a history mechanism for drug codes in RxNorm. The APIs serves some 900 million queries annually to 20,000 users, who integrate RxNorm information into their applications (e.g., health-related mobile applications and research projects). Only the latest version of RxNorm is available through RxNav and the APIs.

One issue is that the use of RxNav and APIs requires access to NLM servers through the internet, which creates a dependency and may not be compatible with the requirements of some production systems. Until recently, NLM has not provided a locally-installable version of RxNav and the drug APIs, because of the complexity of the underlying data and tooling. With the recent development of container-based technology and virtualization software, a platform-independent solution in now available. *RxNav-in-a-Box* provides users with a locally-installable version of the RxNorm APIs, allowing their applications to access the RxNorm data without dependency on NLM servers.

RxNav-in-a-Box Features

Technology. *RxNav-in-a-Box* uses Docker to create container images. Docker is a program that performs operating-system-level virtualization also known as containerization. It creates container images, which are lightweight, stand-alone, executable software packages that include everything needed to run it: code, runtime, system tools, system libraries and settings. Figure 1 shows the container technology used in *RxNav-in-a-Box*.

Components. *RxNav-in-a-Box* is made up of the following components:

- **Tomcat container.** The Tomcat Docker container contains the Tomcat server and includes all the API software and other libraries and software needed to run the APIs. It also contains a local version of the RxNav application, which has all the features of the web version with the exception of the NDF-RT tab and graphs, soon to be abandoned.

Figure 1. Container technology used in *RxNav-in-a-Box*

- **MariaDB container.** The MariaDB Docker container contains MariaDB and the databases which are used by the APIs.

- **Installation and test scripts.** The scripts to install, run and test *RxNav-in-a-Box* are provided along with instructions and user notes needed for developing clients to use the APIs and to run RxNav.
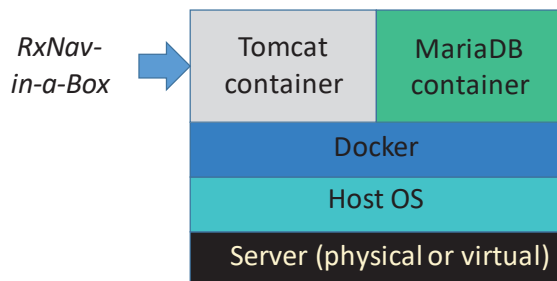
Requirements. Either the Docker Enterprise Edition or the Docker Community Edition must be installed on the user's computer. Docker is available for a variety of environments, including Windows, Mac and Linux. The *RxNav-in-a-Box* images require 4 gigabytes of disk space to run.

Maintenance. A new version of *RxNav-in-a-Box* is generated each month containing the current release of RxNorm. Users are responsible for keeping their systems up to date with the latest version of *RxNav-in-a-Box*.

Benefits. A local version of the APIs can provide performance enhancements, since it eliminates potential network latencies and network problems of the host or the remote computers. In addition, users can control what version they use of the data, which is helpful when doing retrospective studies.

Availability. A beta version can be downloaded at https://rxnav.nlm.nih.gov/RxNav-in-a-Box.html